

Appl. No. 09/940,819

REMARKS

This is in response to the Office Action of 24 August 2004. Claims 1-9 are pending in the application, Claim 7 has been objected to, and Claims 1-6 and 8-9 have been rejected.

By this Response and Amendment, the specification has been amended to correct various typographical errors; Claims 1, 5 and 9 have been amended; Claim 7 has been cancelled; new Claims 10-11 have been added; and Replacement Sheets are provided for corrected Figs. 3, 7 and 8.

No new matter has been added.

In view of the amendments above and remarks below, Applicants respectfully request reconsideration and further examination.

About The Invention

The present invention relates generally to methods and apparatus for determining the alignment of a substrate with respect to a mask, a substrate alignment mark having a periodic structure, and an additional alignment mark having a periodic structure.

Allowable Subject Matter

The Examiner states that "Claim 7 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims".

Applicants thank the Examiner for the indication of allowable subject matter.

Information Disclosure Statement

Applicants thank the Examiner for considering the Information Disclosure

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Statement and for returning an Initialed copy of the Information Disclosure Statement submitted by Applicant.

Priority under 35 USC §119

The Office Action Summary sheet indicates that none of the priority documents have been received.

Applicants' records indicate that the certified copy of European Application No. 00204825.4 was filed concurrently with the initial application filing. Applicants respectfully request that the Examiner confirm whether this certified copy is of record in the file of the present application, and notify Applicants regarding this matter in the next communication from the Office.

Objections to the Specification

The Examiner has objected to the specification, and states that on page 18, line 17, "b_{p11}(+1) and b_{p10}(-1)" should read --b_{p11}(+1) and b_{p11}(-1)--; and that on page 19, line 29, "Fig. 4" should read --Fig. 8--. The Examiner has required correction.

By this amendment, the typographical errors identified by the Examiner have been corrected. In view of the amendments to the specification, Applicants submit that the objection to the specification has been overcome.

Objections to the Drawings

The Examiner has objected to the drawings as failing to comply with 37 CFR §1.84(p)(5). More particularly, the Examiner states that reference numeral 4 is missing from Fig. 3; reference numeral 25' is missing from Fig. 7, and reference character P_c is missing from Fig. 8. The Examiner has further objected to the drawings as failing to comply with 37 CFR §1.84(p)(5) for containing

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reference characters not mentioned in the description.

With respect to missing reference numeral "4" in Fig. 3, the specification has been amended at page 13, line 20, to correctly identify the beam splitter by the reference numeral "14".

With respect to missing reference character "P_C" in Fig. 8, the specification has been amended at page 19, line 13, to identify the composite substrate grating structure as "P₁".

In view of these amendments to the specification, Applicants respectfully submit that these objections to the drawings have been overcome.

With respect to the missing reference numeral "25'" in Fig. 7, a Replacement Sheet including an amended Fig. 7 is submitted herewith, wherein the reference numeral 25' is added to Fig. 7. Support for this amendment can be found in the specification at page 18, lines 3-14, where the order filter is associated with reference numeral 25'.

With respect to the reference characters not mentioned in the description, the specification has been amended to include reference numerals 80-86, and the other reference characters identified by the Examiner have been removed from Figs. 3 and 8. Replacement Sheets are submitted herewith that include the corrections to Figs. 3, 7 and 8. In view of the correction of the drawings, Applicants respectfully submit that these objections to the drawings have been overcome.

Rejections under 35 USC §102

Claim 9 has been rejected under 35 USC §102(a) as being anticipated by Wu (US Patent 6,278,116). Claim 9 has also been rejected under 35 USC §102(e) as being anticipated by Yin, et al., (US Patent 6,727,989).

Claim 9 has been amended to incorporate the limitations of amended

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Claim 1, including, in particular, the limitations found in allowed Claim 7 which specify that the interference pattern is imaged on a mask alignment mark via an optical filter, which selects diffraction orders of the radiation from the substrate alignment marks to proceed to the mask alignment mark. In view of the foregoing, Applicants respectfully submit that rejections under 35 USC §102(a) and 102(e) have been overcome.

Rejections under 35 USC §103(a)

Claims 1-3, 5 and 6 have been rejected under 35 USC §103(a) as being unpatentable over Everett, et al., (US Patent 5,808,742) in view of Yamashita, et al., (US Patent 5,252,414). Claims 4 and 8 have been rejected under 35 USC §103(a) as being unpatentable over Everett, et al., (US Patent 5,808,742) in view of Yamashita, et al., (US Patent 5,252,414) and further in view of Hirukawa, et al., (US Patent 5,402,224).

Independent Claim 1 has been amended to recite that the interference pattern is imaged on a mask alignment mark via an optical filter, which selects diffraction orders of the radiation from the substrate alignment marks to proceed to the mask alignment mark, which recitation was set forth in allowed Claim 7. Similarly, independent Claim 5 has been amended to recite that the interference pattern is imaged via an optical filter, which selects diffraction orders of the radiation from the illuminated marks, which limitation was substantially set forth in allowed Claim 7.

In view of the foregoing, Applicants respectfully submit that the rejection of independent Claims 1 and 5, under 35 USC §103(a), have been overcome. Applicants further submit that the rejections of Claims 2-4, 6 and 8, which depend from amended Claim 1, have also been overcome.

New Claims 10-11

New Claims 10-11 depend from amended independent Claim 5. Claims

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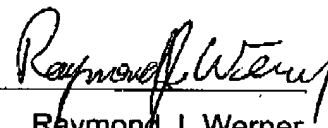
10-11 are directed to on-axis and off-axis aspects of the present invention. These limitations can be found in previously presented Claims 6 and 8, which depend from amended Claim 1.

Conclusion

All of the objections and rejections in the outstanding Office Action of 24 August 2004 have been responded to, and Applicants respectfully submit that the pending Claims 1-6 and 8-11 are now in condition for allowance.

Applicants respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

By 
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Dated: 20 October 2004
Hillsboro, Oregon